

a first set of resilient elongated electrical conductors, each having a first end electrically interconnected to a respective one of the contact locations of the first set of contact locations,

a second end distant from the substrate, and an elongated section extending from the first end to the second end, the elongated section resiliently bending upon depression of the second end towards the substrate, the second ends of the elongated electrical conductors are at an angle with respect to the first end of the elongated electrical conductor and the contact location, the angle being between a minimum and a maximum value, wherein the second ends of two adjacent resilient contact structures are spaced as determined by the angles corresponding to the first and second elongated electrical conductors and wherein respective ones of the second set of contact locations are coupled to corresponding ones of the first set of contact locations; and

a second set of resilient elongated electrical conductors, each having a first end electrically interconnected to a respective one of the contact locations of the second set of contact locations, a second end distant from the substrate, and an elongate section extending from the first end to the second end, the elongated section resiliently bending upon depression of the second end towards the substrate.

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197. (Added) A structure, according to claim 196, further comprising:

an enlargement at ends of the first plurality of resilient elongated electrical conductors.

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198. (Added) A structure, according to claim 196, wherein:

the first plurality of resilient contact structures are composite electrical interconnection elements.

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199. (Added) A structure, according to claim 196, wherein:

the first plurality of resilient elongated electrical conductors are fabricated on a sacrificial substrate prior to electrical interconnection of the first plurality of elongated electrical conductors to the first plurality of contact locations.

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200. (Added) A structure, according to claim 196, further comprising:

a subset of the second set of elongated electrical conductors directly electrically interconnected to the second set of contact locations.

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201. (Added) A structure, according to claim 200, wherein:

the second plurality of elongated electrical conductors are composite interconnection elements.

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202. (Added) A structure, according to claim 200, wherein:

the second plurality of resilient elongated electrical conductors are fabricated on a sacrificial substrate prior to electrically interconnecting the second plurality of resilient elongated electrical conductors to the second plurality of contact locations.

202

203. (Added) A Probe Assembly, comprising:

a second space transformer having a first surface, a second surface and a first plurality of contact locations on the first surface thereof;


an interconnection structure having a first surface, a second surface, a second plurality of elongated resilient electrical conductors extending from the second surface thereof

and a first plurality of elongated resilient electrical conductors extending from the first surface thereof; and

a first space transformer having a first surface, a second surface, a plurality of contact locations disposed on the second surface thereof, and a third plurality of elongated resilient electrical conductors extending from the first surface thereof; wherein:

the second plurality of elongated resilient electrical conductors effect a pressure connection with the contact locations of the second space transformer; and

the first plurality of elongated resilient electrical conductors effect a pressure connection with the contact locations of the first space transformer.

 ~~203~~  
~~204.~~ (Added) A Probe Assembly, according to claim 203, wherein:

the third plurality of elongated resilient electrical conductors are electrically interconnected to contact locations on the first surface of the first space transformer.

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~~205.~~ (Added) A Probe Assembly, according to claim 203, wherein:

the first plurality of elongated resilient electrical conductors are composite electrical interconnection elements.

~~205~~  
~~206.~~ (Added) A Probe Assembly, according to claim 203, wherein:

the second plurality of elongated resilient electrical conductors are composite electrical interconnection elements.

~~206~~  
~~207.~~ (Added) A Probe Assembly, according to claim 203, wherein:

the third plurality of elongated resilient electrical conductors are composite electrical interconnection elements.

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~~208.~~ (Added) A Probe Assembly, according to claim 203, wherein:

one or more of the first plurality of elongated resilient electrical conductors are a composite structure comprising an elongated element and a coating.

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~~209.~~ (Added) A Probe Assembly, according to claim 203, wherein:

one or more of the second plurality of elongated resilient electrical conductors are a composite structure comprising an elongated element and a coating.

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~~210.~~ (Added) A structure, according to claim 203, further comprising:

a clamp for holding the first space transformer in place with respect to said second space transformer,

the clamp comprises a sheet of material supported by a member perpendicularly disposed with respect to the second space transformer;

means for affixing the sheet to the member; and

means for urging the first space transformer towards the first surface of the second space transformer.

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~~211.~~ (Added) A Probe Assembly, according to claim 210, wherein said clamps comprises a sheet made of aluminum.

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~~212.~~ (Added) A Probe Assembly, according to claim 210, wherein the means for urging the first space transformer comprises:

the sheet of material; and

a screw holding the sheet in place with respect to the member and the second space transformer with the first space transformer captured therebetween.

~~212~~

~~213.~~ (Added) A Probe Assembly, according to claim 212, wherein:

said sheet comprises aluminum.

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~~214.~~ (Added) A Probe Assembly, according to claim 212, further comprising:

a member perpendicularly disposed with respect to the second space transformer for supporting the sheet of material.

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~~215.~~ (Added) A Probe Assembly, according to claim 210, wherein the clamp comprises means for affixing a sheet of material supported by a member perpendicularly disposed with respect to the second space transformer, the sheet is held in place to the member by a screw forming the clamp to hold the first space transformer in place with respect to the second space transformer.

~~215~~

~~216.~~ (Added) A Probe Assembly, according to claim 215, wherein:

the sheet and the member are made of aluminum.

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~~217.~~ (Added) A Probe Assembly, according to 203, further comprising:

means for aligning of the first space transformer relative to the second space transformer.

~~217~~  
218. (Added) A Probe Assembly, according to claim 217, wherein the means for aligning the first space transformer comprises:

a plurality of pins disposed on the first space transformer.

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219. (Added) A Probe Assembly, according to claim 217, wherein the means for aligning the first space transformer comprises:

a plurality of projections for mating with grooves on the interconnection structure.

~~219~~  
220. (Added) A Probe Assembly, according to claim 203, wherein:

the contact locations are disposed at a first pitch on the second surface of the second space transformer;

the third plurality of elongated resilient electrical conductors are disposed at a second pitch on the first surface of the second space transformer.

~~220~~  
221. (Added) A Probe Assembly, according to claim 203, wherein:

the first plurality of elongated resilient electrical conductors are disposed at a first pitch on the first surface of the interconnection structure;

the second plurality of elongated resilient electrical conductors are disposed at a second pitch on the second surface of the interconnection structure.

~~221~~  
222. (Added) A Probe Assembly, according to claim 203, wherein:

the contact locations are disposed at a first pitch on the second surface of the first space transformer;

the third plurality of elongated resilient electrical conductors are disposed at a second pitch on the first surface of the second space transformer;

the first plurality of elongated resilient electrical conductors are disposed at the first pitch on the first surface of the interconnection structure;

the second plurality of elongated resilient electrical conductors are disposed at the first pitch on the second surface of the interconnection structure.

*222*  
~~223.~~ (Added) A Probe Assembly, according to claim 203, wherein at least some of the elongated resilient electrical conductors comprise:

a composite interconnection element having an end; and

a tip structure disposed at the end of the composite interconnection element.

*223*  
~~224.~~ (Added) A structure, according to claim 203, wherein:


the third plurality of elongated resilient electrical conductors are electrically interconnected to contact locations on the first surface of the first space transformer.

*224*  
~~225.~~ (Added) A structure, comprising:

a first space transformer having a first surface, a second surface, a plurality of contact locations disposed on the second surface thereof, and a plurality of elongated electrical conductors connected to the first surface thereof, said first space transformer adapted

in use such that ends of the plurality of elongated electrical conductors for making pressure contacts with a corresponding plurality of contact locations on a semiconductor wafer; and

an interconnection structure having a first surface, a second surface, a first plurality of elongated resilient electrical conductors extending from the first surface thereof, said electrical interconnection structure adapted in use such that contact regions of the first plurality of elongated resilient electrical conductors make pressure connections with the plurality of contact locations on the second surface of the first space transformer, the electrical interconnection structure having a second plurality of elongated resilient electrical conductors extending from the second surface thereof, said interconnection structure adapted in use for contact locations of the second plurality of elongated resilient electrical conductors making pressure connections with a plurality of contact locations on a second space transformer.

  
~~225~~  
226. (Added) A structure, according to claim 225, wherein:

the contact locations are disposed at a first pitch on the second surface of the first space transformer;

the plurality of elongated electrical conductors are disposed at a second pitch on the first surface of the first space transformer.

~~226~~  
227. (Added) A structure, according to claim 225, wherein:

the second plurality of elongated resilient electrical conductors are disposed at a first pitch on the second surface of the interconnection structure;

the first plurality of elongated resilient electrical conductors are disposed at a second pitch on the first surface of the interconnection structure.



in use such that ends of the plurality of elongated electrical conductors for making pressure contacts with a corresponding plurality of contact locations on a semiconductor wafer; and

an interconnection structure having a first surface, a second surface, a first plurality of elongated resilient electrical conductors extending from the first surface thereof, said electrical interconnection structure adapted in use such that contact regions of the first plurality of elongated resilient electrical conductors make pressure connections with the plurality of contact locations on the second surface of the first space transformer, the electrical interconnection structure having a second plurality of elongated resilient electrical conductors extending from the second surface thereof, said interconnection structure adapted in use for contact locations of the second plurality of elongated resilient electrical conductors making pressure connections with a plurality of contact locations on a second space transformer.

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226. (Added) A structure, according to claim 225, wherein:

the contact locations are disposed at a first pitch on the second surface of the first space transformer;

the plurality of elongated electrical conductors are disposed at a second pitch on the first surface of the first space transformer.

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227. (Added) A structure, according to claim 225, wherein:

the second plurality of elongated resilient electrical conductors are disposed at a first pitch on the second surface of the interconnection structure;

the first plurality of elongated resilient electrical conductors are disposed at a second pitch on the first surface of the interconnection structure.

~~229~~

~~228.~~ (Added) A structure, according to claim 225, wherein:

the contact locations are disposed at a first pitch on the second surface of the space transformer;

the plurality of elongated resilient electrical conductors are disposed at a second pitch on the first surface of the space transformer;

the second plurality of elongated resilient electrical conductors are disposed at the first pitch on the second surface of the electrical interconnection structure;

the first plurality of elongated resilient electrical conductors are disposed at the first pitch on the first surface of the electrical interconnection structure.

~~230~~

~~229.~~ (Added) A Probe Assembly, comprising:

a second space transformer having a first surface, a second surface and a plurality of second contact locations on the first surface thereof;

a first space transformer having a first surface, a second surface, a plurality of first contact locations disposed on the second surface thereof, and a first plurality of elongated resilient electrical conductors mounted adjacent to and extending from the first surface thereof;

wherein the plurality of first contact locations are connected to the plurality of second contact locations of the second space transformer.

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~~230.~~ (Added) A Probe Assembly, according to claim 229, wherein:

the first plurality of elongated resilient electrical conductors are mounted directly to contact locations on the first surface of the first space transformer.

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~~231.~~ (Added) A Probe Assembly, according to claim 229, wherein:

the first plurality of elongated resilient electrical conductors are connected to contact locations on the first surface of the first space transformer.

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~~232.~~ (Added) A Probe Assembly, according to claim 229, wherein:

the first plurality of elongated resilient electrical conductors are composite interconnection elements.

~~234~~

~~233.~~ (Added) A Probe Card Assembly, according to claim 229, further comprising:

means for aligning the first space transformer relative to the second space transformer.

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~~234.~~ (Added) A Probe Assembly, according to claim 233, wherein the means for aligning the first space transformer comprises:

a plurality of pins disposed on the first space transformer.

~~236~~

~~235.~~ (Added) A Probe Assembly, according to claim 233, wherein the means for aligning the first space transformer comprises:

a plurality of engaging projections and grooves.

~~237~~

~~236.~~ (Added) A Probe Assembly, according to claim 229, wherein:

the contact locations are disposed at a first pitch on the second surface of the first space transformer;

the first plurality of elongated resilient electrical conductors each having a second end, the second ends of the elongated electrical conductors are at an angle with respect to the first end of the elongated electrical conductor and the contact location, the angle being between a minimum and a maximum value, the second ends are disposed at a second pitch as determined by the angles corresponding to the first plurality of elongated resilient electrical conductors; and

the first pitch is a shortest distance between any two adjacent contact pads and the second pitch is a shortest distance between any two adjacent elongate electrical conductors.

  
~~236~~  
237. (Added) A Probe Assembly, comprising:

a second space transformer having a first surface, a second surface and a plurality of second contact locations on the first surface thereof;

a first space transformer having a first surface, a second surface, a plurality of first contact locations disposed on the second surface thereof, and a first plurality of elongated electrical conductors electrically connected adjacent to and extending from the first surface thereof;

wherein the plurality of first contact locations are connected to the plurality of second contact locations of the second substrate.

  
~~237~~  
238. (Added) A Probe Assembly, according to claim 237, wherein:

the first plurality of elongated electrical conductors are electrically interconnected to contact locations on the first surface of the first space transformer.

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~~239.~~ (Added) A Probe Assembly, according to claim 237, wherein:

the first plurality of elongated electrical conductors are electrically interconnected to contact locations on the first surface of the first space transformer.

~~239~~

~~240.~~ (Added) A Probe Assembly, according to claim 237, wherein:

the first plurality of elongated electrical conductors are composite interconnection elements.

~~240~~

~~241.~~ (Added) A Probe Assembly, according to 237, further comprising:

means for aligning the first space transformer relative to the second space transformer.

~~241~~

~~242.~~ (Added) A Probe Assembly, according to claim 241, wherein the means for aligning the first space transformer comprises:

a plurality of pins disposed on the first space transformer.

~~242~~

~~243.~~ (Added) A Probe Assembly, according to claim 241, wherein the means for aligning the first space transformer comprises:

a plurality of engaging projections and grooves.

~~243~~

~~244.~~ (Added) A Probe Assembly, according to claim 237, wherein:

the contact locations are disposed at a first pitch on the second surface of the space transformer;

the first plurality of elongated electrical conductors each having a second end, the second end of the elongated electrical conductors are at an angle with respect to the first end of the elongated electrical conductor and the contact location, the angle being between a minimum and a maximum value, the second ends are disposed at a second pitch as determined by the angles corresponding to the first and second elongated electrical conductors; and

the first pitch is a shortest distance between any two adjacent contact pads and the second pitch is a shortest distance between any two adjacent elongated electrical conductors.

~~244~~  
245. (Added) A Probe Assembly, according to claim 220, wherein the first pitch is greater than the second pitch.

~~245~~  
246. (Added) A Probe Assembly, according to claim 221, wherein the first pitch is substantially the same as the second pitch.

~~246~~  
247. (Added) A Probe Assembly, according to claim 222, wherein the first pitch is greater than the second pitch.

~~247~~  
248. (Added) A structure, according to claim 226, wherein the first pitch is greater than the second pitch.

~~248~~  
249. (Added) A structure, according to claim 227, wherein the first pitch is substantially the same as the second pitch.